

Math 361 Numerical Analysis
8/22/19 Quiz 1

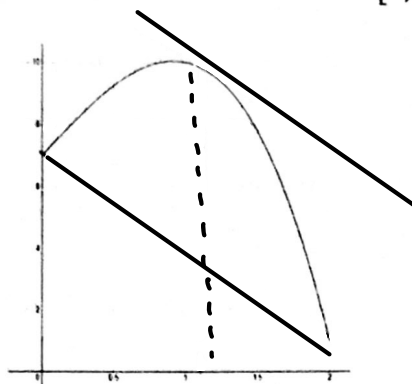
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Name

Answer the following questions in the space provided. Show all work. (20 pts. total.)

1. (3 pts.) Use the graph of f below to find a reasonable estimate of $c \in [0, 2]$ for which

$$f'(c) = \frac{f(2) - f(0)}{2 - 0}$$

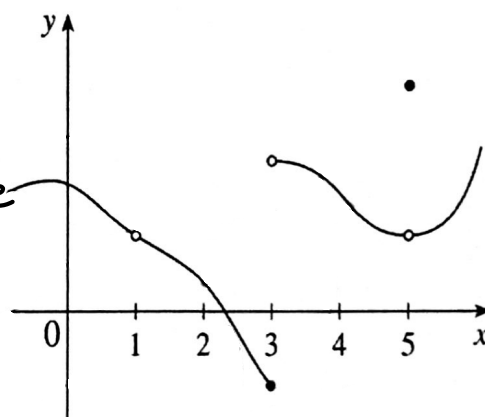
$$c = 1.2$$



2. Use the graph of the function f below to answer the following questions. (2 pts. each)

- (a) True or False: $f \in C(1, 3)$ **True**
 (b) True or False: $f \in C[1, 4]$ **False**
 (c) True or False: f is differentiable at $x = 3$. **False**
 (d) True or False: $\lim_{x \rightarrow 5} f(x) \neq f(5)$ **True**
 (e) True or False: The Mean Value Theorem guarantees that there exists a $c \in [2, 4]$ such that

$$f'(c) = \frac{f(4) - f(2)}{4 - 2} \quad \text{False}$$



3. Let $f(x) = 2x^3 - 1$ on $[0, 1]$. Use the Intermediate Value Theorem to show that $f(x) = 0$ has at least one solution on $[0, 1]$, by following the steps below. (7 pts.)

- (a) Determine whether $f \in C[0, 1]$. (2 pts.)

$f(x)$ is a polynomial $\therefore f \in C[0, 1]$

- (b) Determine whether $f(0) \cdot f(1) < 0$. (2 pts.)

$$f(0) = -1, \quad f(1) = 1 \quad \therefore f(0) \cdot f(1) = -1 \cdot 1 = -1 < 0$$

- (c) State your conclusion in sentence form. (3 pts.)

By the IVT $\therefore \exists c \in [0, 1]$ s.t. $f(c) = 0$

